

# VELS summary statements

Refer to VELS (VCAA) for details. Ian Lowe, MAV 2006

## NUMBER

- 1 Count and compare, begin to add and subtract

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- 2 Place value to 1000
  - Mentally add and subtract to 100
  - Simple unit fractions

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- 3 Place value from 1000 to 0.01, effect of  $\times 10$ ,  $\div 10$ 
  - Add and subtract
  - Multiply by single digits
  - Divide by single digits, noting remainders
  - Number laws
  - Add and subtract decimals and fractions (with models)

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- 4 Place value: millions to thousandths
  - Whole number computation and inverse operations
  - Whole number properties (inc dist law and order of operations)
  - Fractions, decimals, percentage equivalence Ratios, and equivalences
  - Add, subtract and multiply fractions and decimals

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- 5 Factors, multiples, powers, roots
  - Calculations with whole numbers
  - Calculations with fractions, decimals and percentages
  - Calculations with rational numbers (inc. long division)
  - Calculations with positive & negative numbers
  - All equivalences, including ratio and proportion
  - Exponent laws, base 2 calculations, sets of numbers

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- 6 Scientific notation (large and small), and calculation
  - Euclidean algorithm
  - Fractions as decimals (inc repeating)
  - Estimation and computation with all rationals (inc fractions)
  - Surds - meaning and simple computations

## MEASUREMENT

- 1 Language (compare, label, sequence)
  - Informal units

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- 2 Measure and compare (informal units)
  - Use some formal and standard units

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- 3 Informal and formal units to measure length, area, volume, capacity, mass, time
  - Timetables and calendars

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- 4 Estimate and measure in metric units, inc temp and angle
  - Convert metric units

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- 5 Estimate and measure as above
  - Use formulas (for area, perimeter, circles, surface area, volume, rates)

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- 6 Estimate and measure (as above, considering errors)
  - Use formulas (for area, perimeter, circles, surface area, volume, rates)
  - Pythagoras' theorem
  - Trigonometry

## CHANCE AND DATA

- 1 Know 'unpredictability'
  - Collect and display data

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- 2 Language from certain to impossible
  - Collect and display frequency data

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- 3 Intuitive chance language, inc fairness
  - Chance and other experiments and display of data

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- 4 Calculate probabilities, using symmetric properties
  - Simulate complex events
  - Use appropriate displays and summary statistics

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- 5 Use simulation and long-run relative frequency
  - Calculate probabilities using tree diagrams etc.
  - Discrete and continuous data – displays and summary stats
  - Read and interpret univariate graphs

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- 6 List possible outcomes for up to three events
  - Calculate probability based on data
  - Calculate probability for compound events, inc dependent, independent
  - Sampling from populations, displays and summary statistics
  - Bivariate data, scatter, estimate and predict using line of fit

## SPACE

- 1 Language of shape and position
  - Draw
- 2 Language of location, shape and subsets
  - Symmetry and simple transformations
  - Use drawing tools and software
- 3 Language of lines, angles, polygons, solids
  - Make and draw solids, using nets and projections
  - Make tessellations
  - Read maps and plans, using compasses and grids
- 4 Classify shapes and solids
  - Make complex solids using nets, draw solids
  - Use transformations and tessellations
  - Use scale and direction for drawings, maps and plans
- 5 Draw and construct 2D and 3D shapes and tessellations
  - Solve problems using properties of parallel lines, polygons, etc.
  - Use coordinates in the plane
  - Use scale, directions and location on maps and plans
- 6 Construct shapes and solids
  - Solve problems using angle properties of circles
  - Use transformations, including enlargements, considering effect of scale factors
  - Use latitude and longitude

## STRUCTURE

- 3 Language (and, or, not) for two attributes (Venn diagrams)
  - Language of sets and subsets
  - Complete number sentences
- 4 Use conditions to find members of sets
  - Use Venn diagrams or grids to consider statements with language (none, some, all)
  - Describe and complete patterns using recursion or formulas
  - Draw informal graphs to show relationships between two variables
  - Form and solve equations by trial and error
- 5 Use Venn and tree diagrams (and, or, not) and language (none, some, all)
  - Construct power sets
  - Create functions as table, graph and formula
  - Study transformations as functions
  - Solve problems with patterns, formulas, graphs and equations

- 6 Venn diagrams and symbols to three overlapping sets
  - Use functions and graphs including modelling real situations
  - Many methods for the solving of equations
  - Many techniques for equivalent expressions

## WORKING MATHEMATICALLY

- 3 Apply number skills to real life situations
  - Test the truth of mathematical statements and generalisations
  - Use the 'similar problem' strategy to find solutions
  - Use calculators to explore patterns
  - Use geometry software
- 4 Develop and test conjecture
  - Engage in investigations involving modelling
  - Use calculators and computers to investigate
  - Use the mathematical structure of problems to choose strategies for solutions
  - Explain reasoning and procedures
  - Investigate the uses of maths in real and historical situations
  - Use computers to investigate
- 5 Develop mathematical models for real situations
  - Use technology for mathematical purposes
  - Formulate conjectures
  - Use patterns to predict
  - Explain geometric propositions
  - Develop generalisations in words and symbols
  - Use variables, and substitute numbers
  - Develop mathematical models for real situations
  - Analyse reasonableness of points of view, procedures and results
- 6 Choose, use and develop mathematical models and procedures
  - Select and use technology to assist in enquiry
  - Formulate and test conjectures, generalisations and arguments
  - Judge the reasonableness of results

## THINKING

### Reasoning, processing and inquiry

- 3 Collect information and question the validity when appropriate.
  - Apply thinking strategies to organise information including problem solving.
  - Provide reasons for their conclusions.
- 4 Develop their own questions for investigation.
  - Collect relevant information and make judgments about its worth.
  - Use the information they collect to develop concepts or solve problems.
  - Develop reasoned arguments using supporting evidence.
- 5 Use a range of question types.
  - Locate and select relevant information from varied sources for investigations.
  - Use a range of appropriate strategies of reasoning and analysis to evaluate evidence.
  - Consider their own and others' points of view.
  - Complete activities focusing on problem solving.
- 6 Generate questions that explore perspectives.
  - Process and synthesise complex information.
  - Perform problem solving and decision making.
  - Make informed decisions based on their analysis of information.

### Creativity

- 3 Apply creative ideas in practical ways and test the possibilities of ideas they generate.
  - Use open-ended questioning and integrate available information to explore ideas.
- 4 Use creative thinking strategies to generate imaginative solutions when solving problems.
  - Test the possibilities of concrete and abstract ideas generated by themselves and others.
- 5 Apply creative thinking strategies to generate multiple options, problem definitions and solutions.
  - Demonstrate creativity in the ways they explore ideas in a range of contexts.
- 6 Experiment with innovative possibilities within the parameters of a task.
  - Take calculated risks when defining tasks and generating solutions.
  - Apply selectively a range of creative thinking strategies.

### Reflection, evaluation and metacognition

- 3 Identify strategies they use to organise their ideas, and explain their thinking.
  - Identify and provide reasons for their thinking.

- 4 Use a broad range of thinking processes and tools, and reflect on and evaluate their effectiveness.
  - Articulate their thinking processes.
- 5 Explain the purpose of a range of thinking tools and use them in appropriate contexts.
  - Reflect on their thinking processes during their investigations.
- 6 Explain conscious changes that may occur in their own and others' thinking.
  - Discuss their thinking and evaluate their effectiveness.
  - Select and use thinking processes and tools appropriate to particular tasks.

## COMMUNICATION

### Listening, viewing and responding

- 4 Ask clarifying questions
  - Develop interpretations of the content and provide reasons.
- 5 Interpret complex information
  - Use specialised language and symbols as appropriate to context
  - Apply prior knowledge to new situations
  - Challenge assumptions
  - Justify their own interpretations.

### Presenting

- 4 Summarise and organise ideas and information, logically and clearly
- 5 Present clearly as appropriate to context, purpose and audience

## ICT

### ICT for visualising thinking

- 3 Use ICT tools to identify relationships.
- 4 Use ICT tools to analyse concepts
- 5 Use rule-using software to assist with problem solving
- 6 Apply ICT techniques to test hypotheses.

### ICT for creating

- 3 Use tools and a range of data types to inform.
- 4 Process different data types.
- 5 Use ICT to solve problems

## DESIGN

### Investigating and designing

- 3 Use words, labelled sketches and models to communicate the details of their designs.
- 4 Use words, labelled sketches and models.
- 5 Use a variety of drawing and modelling techniques to visualise concepts.